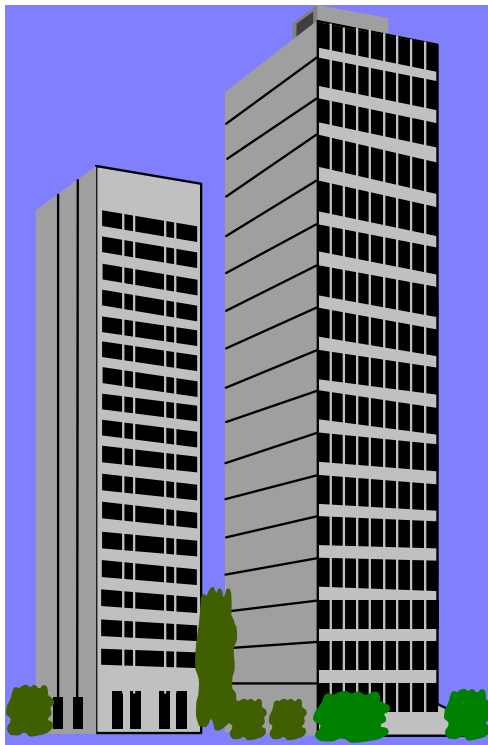


INDOOR AIR QUALITY ASSESSMENT

**Bristol County 2nd District Court
Fall River Court Complex
45 Rock Street
Fall River, Massachusetts**



Prepared by:
Massachusetts Department of Public Health
Bureau of Environmental Health Assessment
October, 2000

Background/Introduction

In response to a request from building occupants, an indoor air quality assessment was done at the Bristol County 2nd District Court, Fall River Court Complex (FRCC), 45 Rock Street, Fall River, Massachusetts. This assessment was conducted by the Massachusetts Department of Public Health (MDPH), Bureau of Environmental Health Assessment (BEHA). Employees reported complaints of headaches, upper respiratory symptoms and sinus irritation.

On June 8, 2000 Michael Feeney, Chief of Emergency Response/Indoor Air Quality (ER/IAQ), made a visit to this building. Mr. Feeney also conducted a follow up visit on September 1, 2000 to conduct further indoor air monitoring. The FRCC consists of two separate buildings that are joined by a hallway and elevator shaft. The original Fall River District Courthouse was built in 1905. An addition was made to the courthouse in 1978. Each building operates on separate heating, ventilation and air conditioning system located in the basement of each building. Conditions noted in this report will be denoted as the original Fall River District Courthouse (old building) (see Picture 1) and the 1978 addition (new building) (see Picture 2).

The old building is a two-story structure with an occupied basement. It contains courtroom 1, courtroom 5, small claims office, IT room, computer room, jury room, civil clerk's office, victim/witness desk, judge's lobbies, jury of six office and the original lock up which is now used for storage. The addition is a two story structure containing courts 2, 3, and 4, the probation offices, accounting, law library, jury deliberation rooms, judge's lobby, lock up, restraining order office and main lobby. Windows in the old building and in the addition can be opened, however a number of windows are missing cranks in the addition (see Picture 3).

On March 17, 1986, the Massachusetts Department of Labor and Industries (MDLI) evaluated the computer room (MDLI, 1986) due to employee complaints of headaches and nausea. MDLI recommended that the ventilation system thermostat in this area be set in the “on” setting to operate the ventilation system during business hours. In 1996, MDLI conducted another evaluation of the court complex and recommended (1) the heating, ventilating and air-conditioning (HVAC) system be balanced, (2) remove or clean water damaged carpet in the adult probation office, and (3) replace missing ceiling tiles in the suspended ceiling (MDLI, 1996).

Methods

On June 8, 2000, air tests for carbon dioxide were taken with the Telaire, Carbon Dioxide Monitor and tests for temperature and relative humidity were taken with the Mannix, ThPen PTH8709 Hygrometer/Thermometer. On September 1, 2000, carbon dioxide levels, temperature and relative humidity were taken with the TSI, Q-Trak, IAQ Monitor.

Results

The courthouse has a population of approximately 80 employees and an estimated 250 to 500 other individuals who visit the court on a daily basis. The tests were taken under normal operating conditions. Test results appear in Tables 1-7. Air sampling results are listed in the tables by location that the air sample was taken.

Discussion

Ventilation

It can be seen from the tables that carbon dioxide levels were above 800 parts per million parts of air [ppm] in twenty-seven of thirty-one areas sampled on June 8, 2000 and sixteen of twenty-two areas throughout the FRCC. These carbon dioxide levels are indicative of an inadequate fresh air supply in most areas within the FRCC.

Fresh air is supplied in the old building by an air-handling unit (AHU) located on the roof (see Picture 4). It appears that ductwork and heat pumps were retrofitted into the old building, presumably during the construction of the addition. The fresh air intake of the AHU had its louvers set in the closed position, which limits the amount of fresh air drawn into the unit. With limitation of fresh air intake, the AHU recirculates air from occupied spaces in the old building. This condition can result in the accumulation of normally occurring indoor environmental pollutants, which can in turn cause indoor air quality related symptoms.

The AHU is the sole source of exhaust ventilation for the old building. The setting of louvers in the exhaust ventilation section of the AHU could not be examined. If these louvers are closed, the removal of stale air from the old building is also limited. With the lack of exhaust ventilation, pollutants that exist in the interior of a building will build up and possibly lead to complaints of poor air quality. Of note is the civil clerk's main office. No exhaust vent could be identified in the main office. An exhaust vent was located in the office behind the main office (i.e. the rear office). When the door to the rear office is closed, the exhaust vent is separated from the main office, resulting in no exhaust ventilation for the civil clerk's main office.

Ceiling mounted heat pumps that distribute air to each area by ceiling or wall mounted air diffusers control airflow to the occupied spaces in the old building. These heat pumps were found to activate/deactivate during the assessment. A thermostat controls activation of these heat pumps. Since the heat pumps were not in continuous operation, the setting of the thermostats was likely to be “auto”, which activates/deactivates the fans in these units when a predetermined temperature is achieved. As previously recommended, the thermostats should be set in the “on” setting to provide continuous ventilation during business hours.

Ventilation for the addition is provided by AHUs located in the mechanical room behind the restraining order office. Fresh air is drawn through rooftop fresh air intakes and distributed by a series of AHUs to various areas of the addition. Fresh air is delivered to offices by ceiling mounted fresh air diffusers. Fresh air in court rooms is delivered by ceiling vents in the public observation areas and above the lip of a rotunda – like structure over the bench (see Pictures 5 and 6). As with the old building, these vents were found to be activated/deactivated throughout the assessments, which can indicate that the provision of fresh air to these areas is also limited by the thermostat setting.

Ceiling mounted exhaust vents provide exhaust ventilation. Of note is the lack of mechanical exhaust ventilation in the accounting office. Building occupants reported that this office was added to the building subsequent to the completion of the addition. While a fresh air supply exists in the ceiling, no mechanical exhaust vent exists in this office. In an effort to provide some air circulation, a ceiling tile had been replaced with a plastic grate. The grate was installed to allow heat to exhaust into the ceiling plenum. Little, if any, air movement was observed from the occupied space into the ceiling plenum, however airflow from the ceiling plenum into occupied areas was noted. It is possible

that air currents are created by leakage from the HVAC ductwork, which could allow particles in the ceiling plenum to enter the accounting office through this grate.

Replacing the plastic grate with a solid ceiling tile would help to prevent possible particle penetration from the ceiling plenum.

In order to have proper ventilation with a mechanical supply and exhaust system, the systems must be balanced to provide an adequate amount of fresh air to the interior of a room while removing stale air. Building employees reported that the ventilation system was balanced within the last year. Balancing of the ventilation system involves the analysis of the velocity of airflow [measured in cubic feet per minute (cfm)]. If this activity was done, the contractor should provide a ventilation balancing report detailing the air velocity measured for each vent examined. Once air velocity is measured, airflow can be increased or limited through the repositioning of louvers. In order to properly balance vents, it is recommended that the air velocity measured for a vent be +/- 10 percent of the design total designated by the architect (SMACNA, 1993). In order to balance the system, the ventilation contractor needs to obtain a copy of the building's blueprints in order to ascertain the total air velocity design for each vent. Whether this activity was done is doubtful since blueprints for the old building's ventilation system could not be located. The condition of the exhaust vent in court 1 also would render balancing difficult (see Picture 7). Damage to these louvers renders control of the airflow into this vent impossible.

The Massachusetts Building Code requires a minimum ventilation rate of 20 cubic feet per minute (cfm) per occupant of fresh outside air or have openable windows in each room (SBBRS, 1997; BOCA, 1993). The ventilation must be on at all times that the room is occupied. Providing adequate fresh air ventilation with open windows and

maintaining the temperature in the comfort range during the cold weather season is impractical. Mechanical ventilation is usually required to provide adequate fresh air ventilation.

Carbon dioxide is not a problem in and of itself at levels measured in this building. It is used as an indicator of the adequacy of the fresh air ventilation. As carbon dioxide levels rise, it indicates that the ventilating system is malfunctioning or the design occupancy of the room is being exceeded. When this happens, a buildup of common indoor air pollutants can occur, leading to discomfort or health complaints. The Occupational Safety and Health Administration (OSHA) standard for carbon dioxide is 5,000 parts per million parts of air (ppm). Workers may be exposed to this level for 40 hours/week, based on a time-weighted average (OSHA, 1997).

The Department of Public Health uses a guideline of 800 ppm for publicly occupied buildings. A guideline of 600 ppm or less is preferred in schools due to the fact that the majority of occupants are young and considered to be a more sensitive population in the evaluation of environmental health status. Inadequate ventilation and/or elevated temperatures are major causes of complaints such as respiratory, eye, nose and throat irritation, lethargy and headaches.

Temperature readings on June 8, 2000 and September 1, 2000 were measured in a range of 65° F to 74° F which was slightly below the BEHA recommended range for comfort in court 3, which was unoccupied during testing. The BEHA recommends that indoor air temperatures be maintained in a range of 70° to 78° F in order to provide for the comfort of building occupants. In many cases concerning indoor air quality, fluctuations of temperature in occupied spaces are typically experienced, even in a building with an adequate fresh air supply. Complaints of excess heat were expressed to

BEHA staff in the rooms of the addition facing south. As noted previously, it appears that the HVAC system operation is limited by thermostat settings. Without exhaust ventilation, heat from electrical devices (e.g., photocopiers, incandescent lights, computer monitors, etc.) can build up in occupied space over the course of the day. This heat, combined with radiant heat transmitted through sun-heated window frames, can lead to increased temperatures in these offices in late afternoon.

The restraining order office was reported as being prone to cold air drafts in cold weather. The front of these offices has a plexiglass window with several holes. This glass is located directly opposite the main entrance to the FRCC main entrance. With westerly winds in the winter, drafts of air entering the lobby would penetrate the restraining order office through the window holes. This condition would make temperature control difficult in the main lobby and restraining order office.

The relative humidity on June 8, 2000 was within a range of 30 to 49 percent. The relative humidity on September 1, 2000 was within a range of 48 to 63 percent. Most relative humidity measurements were within the BEHA recommended comfort range. Please note that outdoor relative humidity on September 1, 2000 was measured at 74 percent on a hot, humid day, which indicates that the HVAC system is removing moisture from the indoor air of the FRCC. The BEHA recommends a comfort range of 40 to 60 percent for indoor air relative humidity. Relative humidity levels in the building would be expected to drop during the winter months due to heating. The sensation of dryness and irritation is common in a low relative humidity environment. Low relative humidity is a common problem during the heating season in the northeast part of the United States.

Microbial/Moisture Concerns

The interior of the old building AHU was evaluated during warm weather with the cooling coils activated. As outdoor air is drawn over cooling coils in the AHU, moisture in the form of condensation is generated. As condensation collects, water droplets are formed which drip from the cooling coils. Condensation is collected in drip pans beneath the cooling coils. Drip pans direct collected water from the AHU onto the roof. Pooling water was noted in the AHU drip pan (see Picture 8). The surface of the drip pan is severely corroded and rust chips were noted floating on the surface of the pooled water. Water emptying from the drain pan pipe onto the roof appeared to be minimal, which is a possible sign of clogging. Standing water in drip pans can serve as a growth medium for mold. If mold growth occurs, spores and odors can be transported into the interior of the building via the HVAC system.

Court 1 (see Picture 9) and Court 5 had water damaged wall plaster. Water-damaged plaster can indicate that water is penetrating through exterior wall brickwork. Plaster can serve as a growth medium for mold if repeatedly moistened.

As noted previously, heat pumps were retrofitted into the old building to provide a mechanical ventilation system. These heat pumps provide both heating and cooling. Since these units can provide air-conditioning, provisions in each unit to drain condensation generated by the cooling coils must be made. In the civil clerk's office on the first floor, the contractor configured the condensation drain to empty into the sink of the restroom (see Picture 10). Above the ceiling at the victim/witness aid desk, a drip pan was installed below the heat pump to collect condensation from the exterior of the casing or pipe connections (see Picture 11). This condensation collection pan does not have a drain. Condensation collects in one end of the pan and eventually evaporates. Heavy

rust was noted at one end of this pan (see Picture 12), which indicates that this collection pan may have had standing water within it for substantial periods of time. Standing water can be a mold growth medium, resulting in musty/unpleasant odors.

Several areas had water coolers located on wall-to-wall carpeting. The carpet below the water dispensing nozzles can become moistened by use of the cooler, and was observed to be wet at the time of the BEHA inspection. Porous materials that are wet repeatedly can serve as media for mold growth. The American Conference of Governmental Industrial Hygienists (ACGIH) recommends that carpeting be dried with fans and heating within 24 hours of becoming wet (ACGIH, 1989). If carpets are not dried within this time frame, mold growth may occur. Water-damaged carpeting cannot be adequately cleaned to remove mold growth. The application of a mildewcide to moldy carpeting is not recommended.

Other Concerns

The old building's AHU and heat pumps in a number of areas are installed with air filters that did not fit flush with their racks. Filters should be one piece that fits flush with the filter rack. If two filters are to be used, the filter rack must have the appropriate equipment to make each filter fit flush in the rack. Air drawn into the AHU will bypass filters through spaces between filters and racks. This can result in dust, dirt and other debris being distributed by the ventilation system. AHU filters are designed to strain particulates from airflow. In order to decrease aerosolized particulates, disposable filters with an increased dust spot efficiency can be installed in the heat pumps. The dust spot efficiency is the ability of a filter to remove particulates of a certain diameter from air passing through the filter. Filters that have been determined by ASHRAE to meet its

standard for a dust spot efficiency of a minimum of 40 percent would be sufficient to reduce airborne particulates (Thornburg, D., 2000; MEHRC, 1997; ASHRAE, 1992). Note that increased filtration can reduce airflow produced by the heat pump by increased resistance (called pressure drop). Prior to any increase of filtration, each heat pump should be evaluated by a ventilation engineer to ascertain whether it can maintain function with more efficient filters.

Several areas in the old building contained window-mounted air conditioners. This equipment is normally equipped with filters, which should be cleaned or changed as per the manufacturer's instructions to avoid the build up and re-aerosolization of dirt, dust and particulate matter.

Damaged fiberglass insulation was noted in offices on the second floor of the old building (see Picture 13). Fiberglass insulation can be a source of skin, eye and respiratory irritation to sensitive individuals. The lock up in the old building could not be accessed during these assessments, but it is likely that the floors of these cells contain drains that would have dry traps. A dry drain trap can allow for sewer gas to back up into the old building basement area. Sewer gas can be irritating to the eyes, nose and throat. The elevator has an exhaust vent that does not appear to be functioning. Exhaust ventilation in elevator cars is necessary to remove unwanted odors from the interior.

The restraining order office is located adjacent to the mechanical room that services the addition. Dividing these areas is a common wooden door. In general, a door dividing an occupied space and a mechanical room should be made of a fireproof material and have the door/door frame junction sealed to decrease and/or eliminate odor and noise penetration into the occupied areas.

Conclusions/Recommendations

The solution to the indoor air quality problem at the FRCC is somewhat complicated. A number of offices in the old building are not equipped with exhaust ventilation. This can allow for environmental pollutants to build up in these areas. This condition, in combination with a limitation of fresh air delivered into the building, will result in the accumulation of stale air and environmental pollutants in this building. Employee symptoms and complaints reported during this site visit are consistent with what might be expected in an environment with a variety of opportunities for mold growth combined with a poorly operating or non-existent ventilation system. A two-phase approach is required, consisting of immediate (**short-term**) measures to improve air quality within the FRCC and **long-term** measures that will require planning and resources to adequately address the overall indoor air quality concerns within this courthouse. In view of the findings at the time of these visits, the following conclusions and recommendations are made:

The following **short-term** measures should be considered for immediate implementation:

1. Replace the plastic grate in the accounting office with a solid ceiling tile.
 2. Repair the louvers to the court 1 exhaust vent.
 3. Operate all HVAC systems while the building is occupied. Set all thermostats in the “on” setting to operate the vent system during FRCC business hours.
 4. Consult a ventilation engineer to maximize the operation of the HVAC system and repair if necessary the fresh air intake louvers in the old building AHU.
- Increase the amount of fresh air drawn by AHUs to increase comfort. Have the mechanical fresh air supply and exhaust balanced.

5. Increase the use of window shades to limit radiant heat from window frames in south-facing offices of the addition.
6. Install brackets to eliminate spaces between filters in the old building AHU.
7. Examine the feasibility of increasing the efficiency of AHU and heat pump filters.

Prior to any increase of filtration, each piece of air handling equipment should be evaluated by a ventilation engineer as to whether it can maintain function with more efficient filters.
8. For buildings in New England, periods of low relative humidity during the winter are often unavoidable. Therefore, scrupulous cleaning practices should be adopted to minimize common indoor air contaminants whose irritant effects can be enhanced when relative humidity is low. An increase in filter efficiency in the HVAC system may also be advisable. Drinking water during the day can help ease some symptoms associated with a dry environment (throat and sinus irritations).
9. Examine heat pipes for drains. If missing, consider installing drains to prevent water pooling and subsequent mold growth.
10. Consider placing water coolers on plastic/rubber floor mats to limit water damage to carpeting.
11. Replace the door between the restraining order office and mechanical room with a fireproof door. Render this door airtight by installing weather-stripping on the doorframe and base of the door.
12. Repair the elevator exhaust vent.
13. Seal floor drains in the old lock up cells to prevent sewer gas penetration through dry drainpipes.

14. Replace missing window crank handles.
15. Change filters in window-mounted air conditioners as per the manufacturer's instructions to prevent the re-aerosolization of dirt, dust and particulate matter.
16. Repair damaged fiberglass insulation.

The following **long-term** measures should be considered. A ventilation engineer should be consulted to resolve air supply/exhaust ventilation building-wide. The following areas should be addressed:

1. Examine the feasibility of providing local exhaust ventilation for the accounting and civil clerk's offices.
2. Examine the feasibility of installing floor dividers in the main lobby to limit cold air penetration (see Figure 1 for an example).
3. Examine the source of moisture that is damaging wall plaster in Court 1 and Court 5.
5. Consider re-pointing exterior wall brick to prevent further wall damage.

References

ACGIH. 1989. Guidelines for the Assessment of Bioaerosols in the Indoor Environment. American Conference of Governmental Industrial Hygienists, Cincinnati, OH.

ASHRAE. 1992. Gravimetric and Dust-Spot Procedures for Testing Air-Cleaning Devices Used in General Ventilation for Removing Particulate Matter. American Society of Heating, Refrigeration and Air Conditioning Engineers. ANSI/ASHRAE 52.1-1992.

BOCA. 1993. The BOCA National Mechanical Code/1993. 8th ed. Building Officials & Code Administrators International, Inc., Country Club Hills, IL.

MDLI. 1996. Letter to John O'Neil, Chief Justice, Fall River District Court from L. Richard Adams and Paul Aboody, MDLI, concerning an inspection Fall River District Court in Fall River, MA, Dated January 18, 1996. Department of Labor Industries, Division of Occupational Safety, West Newton, MA.

MDLI. 1986. Letter to Thomas Kitchen, Clerk of Courts, Fall River District Court from Robert Kenrick, MDLI, concerning an inspection Fall River District Court computer room in Fall River, MA, dated March 17, 1986. Department of Labor Industries, Division of Occupational Safety, West Newton, MA.

MEHRC. 1997. Indoor Air Quality for HVAC Operators & Contractors Workbook. MidAtlantic Environmental Hygiene Resource Center, Philadelphia, PA.

OSHA. 1997. Limits for Air Contaminants. Occupational Safety and Health Administration. Code of Federal Regulations. 29 C.F.R. 1910.1000 Table Z-1-A.

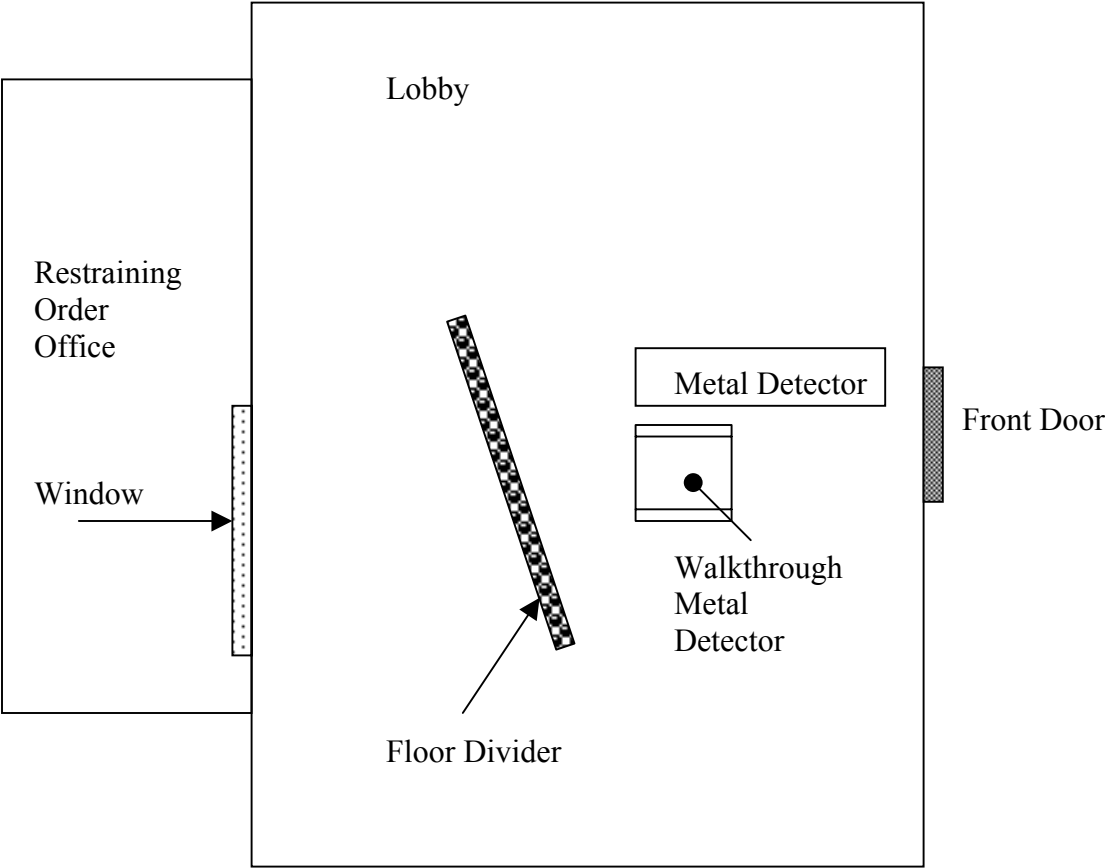
SBBRS. 1997. Mechanical Ventilation. State Board of Building Regulations and Standards. Code of Massachusetts Regulations. 780 CMR 1209.0

SMACNA. 1993. HVAC Systems Testing, Adjusting & Balancing. Sheet Metal and Air Conditioning Contractors' National Association, Inc., Chantilly, VA.

Thornburg, D. Filter Selection: a Standard Solution. *Engineering Systems* 17:6 pp. 74-80.

Figure 1

Proposed Placement of Floor Divider in Main Lobby to Direct Cold Air Away from Restraining Order Office



Picture 1



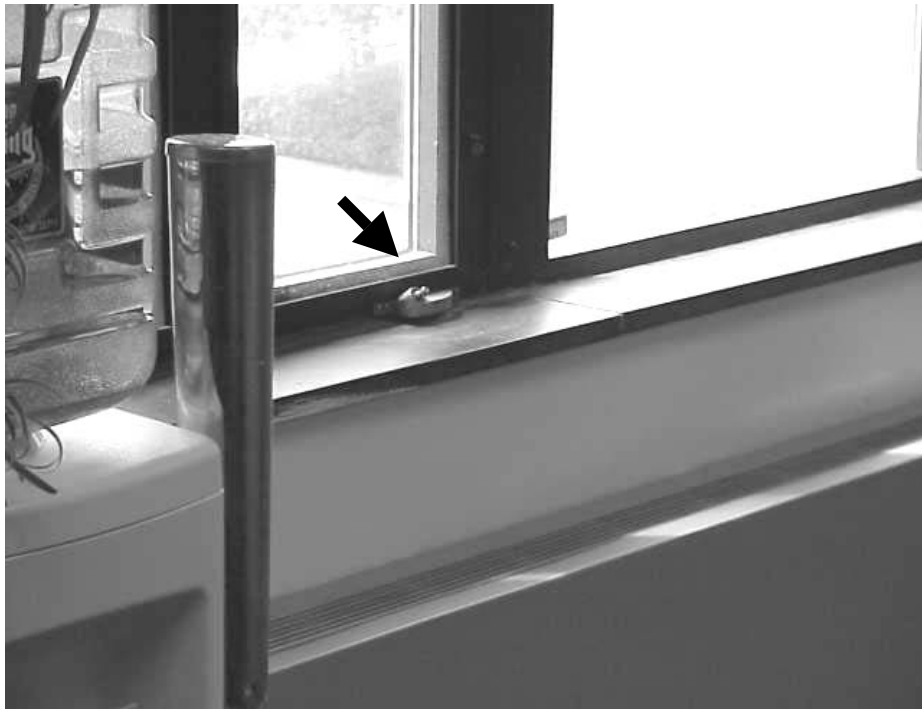
Fall River District Court Constructed in 1905

Picture 2



Fall River District Court Addition Constructed in 1978

Picture 3



Window with Missing Crank Handle

Picture 4



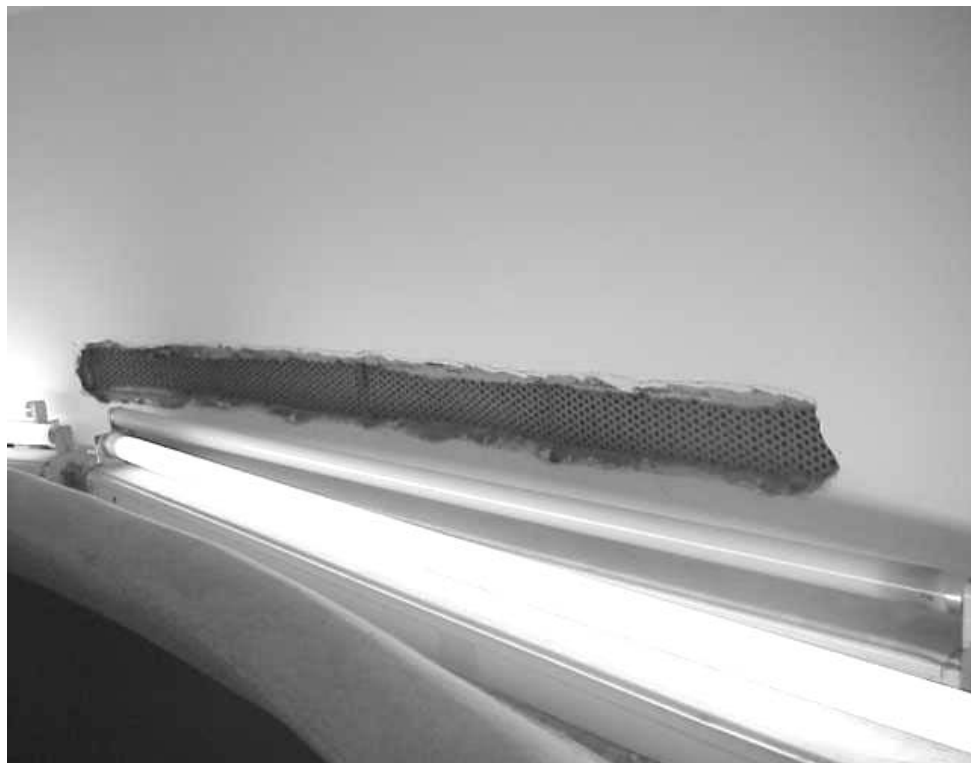
AHU for Old Building

Picture 5



Rotunda-like ceiling in Court 3

Picture 6



Fresh Air Supply Vent over “Rotunda” Lip

Picture 7



Damaged Louvers of Court 1 Exhaust Vent

Picture 8



Corrosion of Coil and Drain Pan in the Old Building AHU

Picture 9



Water Damaged Plaster in Court 1

Picture 10



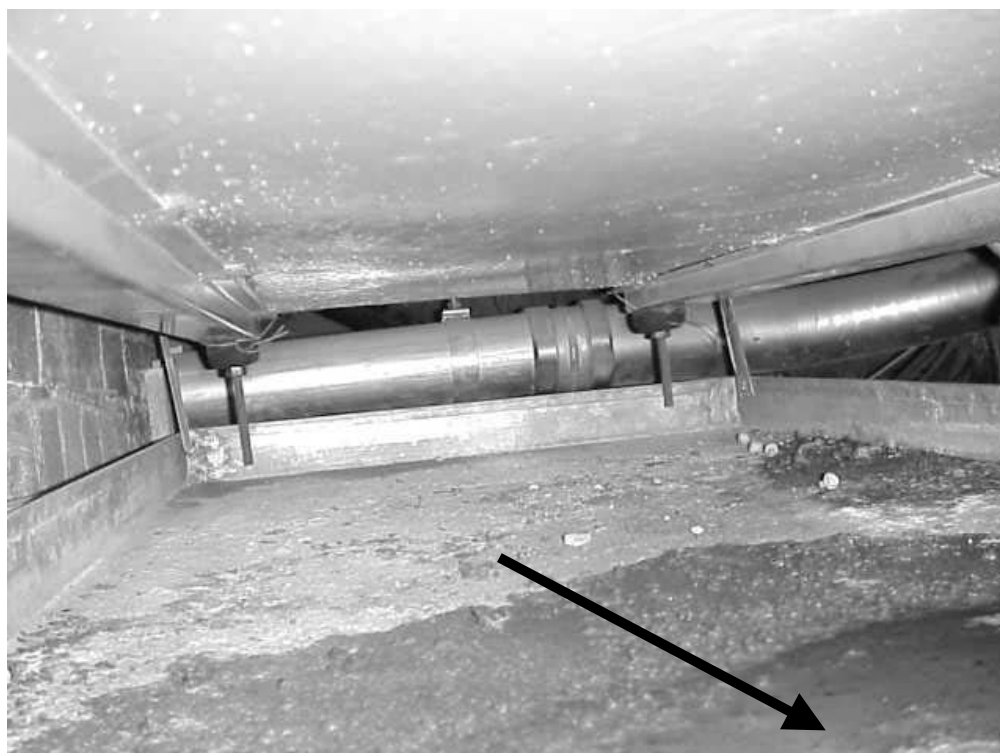
Condensate Drain from Heat Pump in Civil Clerk's Office restroom Sink

Picture 11



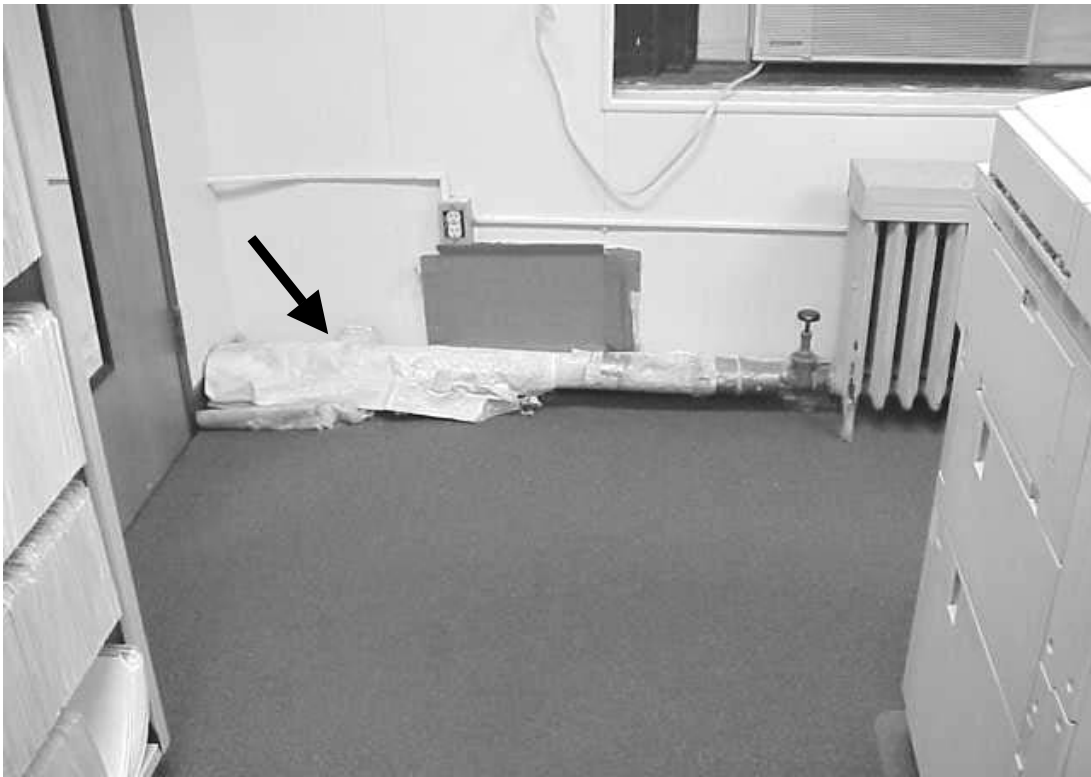
Drain Pan beneath Heat Pump in Victim/Witness Desk Area

Picture 12



Corrosion in Drain Pan beneath Heat Pump in Victim/Witness Desk Area

Picture 13



Damaged Fiberglass Pipe Insulation in the Small Claims Office

TABLE 1

Indoor Air Test Results – Fall River District Court, Fall River, MA – June 8, 2000

Remarks	Carbon Dioxide *ppm	Temp. °F	Relative Humidity %	Occupants in Room	Windows Openable	Ventilation		Remarks
						Intake	Exhaust	
Outside (Background)	443	72	35					
Court 5	1513	72	42	5	Yes	Yes	Yes	Supply and exhaust off, bubbled paint, efflorescence, hole in wall
3 rd Floor Lobby	1251	72	38	4	No	No	No	
Small Claims	1268	74	38	2	No	Yes	Yes	Supply and exhaust off, 1 CT, damaged fiberglass insulation
Computer Room	1045	74	34	1	No	Yes	Yes	Supply and exhaust off-blocked by cardboard, water cooler on carpet, 8 computers
IT Room	1014	72	33	0	No	Yes	Yes	Supply and exhaust off
3 rd Floor Judge's Lobby	793	71	35	0	No	Yes	Yes	Supply and exhaust off
Court 2	872	71	42	15	No	Yes	Yes	Exhaust off
Jury Deliberation	925	69	42	2	No	Yes	Yes	
Court 3	817	65	46	0	No	Yes	Yes	Empty 3 hours, exhaust off

* ppm = parts per million parts of air
CT = water-damaged ceiling tiles

Comfort Guidelines

Carbon Dioxide - < 600 ppm = preferred
600 - 800 ppm = acceptable
> 800 ppm = indicative of ventilation problems
Temperature - 70 - 78 °F
Relative Humidity - 40 - 60%

TABLE 2

Indoor Air Test Results – Fall River District Court, Fall River, MA – June 8, 2000

Remarks	Carbon Dioxide *ppm	Temp. °F	Relative Humidity %	Occupants in Room	Windows Openable	Ventilation		Remarks
						Intake	Exhaust	
Shredder Room	823	74	41	1	No	Yes	No	Door open
Rear Office	820	73	35	1	No	Yes	No	
Probate Back Main Office	807	73	37	3	No	Yes	No	
Jury of 6 Office	940	72	32	4	No	Yes	Yes	Musty odor, water cooler on carpet, door open
Victim Witness Desk	743	72	33	0	No	Yes	No	
Clerk Magistrate-Upper Main Office	817	72	30	4	No	No	Yes	Exhaust off, water cooler on carpet,
Clerk Magistrate-Lower Office	827	72	37	1	No	No	Yes	Exhaust off
Court 4	756	71	38	9	No	Yes	Yes	Exhaust off
Law Library	722	73	35	0	No	Yes	No	Supply off
Judge's Lobby	815	73	38	1	No	Yes	Yes	Supply and exhaust off
Judge's Lobby – second	911	73	38	1	No	No	Yes	

* ppm = parts per million parts of air
CT = water-damaged ceiling tiles

Comfort Guidelines

Carbon Dioxide - < 600 ppm = preferred
600 - 800 ppm = acceptable
> 800 ppm = indicative of ventilation problems
Temperature - 70 - 78 °F
Relative Humidity - 40 - 60%

TABLE 3

Indoor Air Test Results – Fall River District Court, Fall River, MA – June 8, 2000

Remarks	Carbon Dioxide *ppm	Temp. °F	Relative Humidity %	Occupants in Room	Windows Openable	Ventilation		Remarks
						Intake	Exhaust	
Court 1	1714	70	47	20	No	Yes	Yes	
Restraining Orders	837	73	36	2	No	Yes	Yes	Temperature complaints-cold in summer/warm in winter
Front Lobby	829	73	36	5	No	Yes	Yes	Outside door open
Jury Room-Old Building-outer	988	73	42	1	Yes	Yes	Yes	Supply and exhaust off, door open
Jury Room-Old Building-inner	964	73	39	0	Yes	Yes	Yes	Supply and exhaust off
Jury Pool Room	937	74	36	1	Yes	Yes	Yes	Supply and exhaust off, door open
Civil Clerk's Main Office	1193	75	30	3	Yes	Yes	No	Supply off, abandoned gravity vent
Civil Clerk's Private Office	1205	73	30	0	Yes	Yes	Yes	
Civil Clerk's Restroom								See pictures
Accounting	956	73	38	2	No	Yes	No	Supply off, Egg-crate exhaust vent (see report)
Probation – Main	822	73	35	4	No	Yes	Yes	Supply and exhaust off, water cooler on carpet

* ppm = parts per million parts of air
CT = water-damaged ceiling tiles

Comfort Guidelines

Carbon Dioxide - < 600 ppm = preferred
600 - 800 ppm = acceptable
> 800 ppm = indicative of ventilation problems
Temperature - 70 - 78 °F
Relative Humidity - 40 - 60%

TABLE 4

Indoor Air Test Results – Fall River District Court, Fall River, MA – June 8, 2000

Remarks	Carbon Dioxide *ppm	Temp. °F	Relative Humidity %	Occupants in Room	Windows Openable	Ventilation		Remarks
						Intake	Exhaust	
Flannery	855	73	37	0	No	Yes	No	Supply off

Comfort Guidelines

* ppm = parts per million parts of air
CT = water-damaged ceiling tiles

Carbon Dioxide -	< 600 ppm = preferred 600 - 800 ppm = acceptable > 800 ppm = indicative of ventilation problems
Temperature -	70 - 78 °F
Relative Humidity -	40 - 60%

TABLE 5

Indoor Air Test Results – Fall River District Court, Fall River, MA – September 1, 2000

Remarks	Carbon Dioxide *ppm	Temp. °F	Relative Humidity %	Occupants in Room	Windows Openable	Ventilation		Remarks
						Intake	Exhaust	
Outside (Background)	403	82	74					
Law Library	805	70	59	0	No	Yes	Yes	
Adult Probation – Back Room	875	70	60	3	Yes	Yes	Yes	Door open
Probation	839	70	58	5	Yes	Yes	Yes	Door open
Cashier's Bookkeeper	862	70	58	2	No	Yes	No	Door open
Victim Witness Desk	840	70	57	0	No	Yes	No	
Jury of 6	969	71	54	2	No	Yes		
Upper Clerks	893	71	58	3	No	Yes	Yes	
Lower Clerks	891	72	57	1	No	No	Yes	
Main Lobby	879	71	57	2	No	Yes	Yes	
Restraining Orders	922	72	58	2	No	Yes	Yes	Supply vent blocked

* ppm = parts per million parts of air
CT = water-damaged ceiling tiles

Comfort Guidelines

Carbon Dioxide - < 600 ppm = preferred
600 - 800 ppm = acceptable
> 800 ppm = indicative of ventilation problems
Temperature - 70 - 78 °F
Relative Humidity - 40 - 60%

TABLE 6

Indoor Air Test Results – Fall River District Court, Fall River, MA – September 1, 2000

Remarks	Carbon Dioxide *ppm	Temp. °F	Relative Humidity %	Occupants in Room	Windows Openable	Ventilation		Remarks
						Intake	Exhaust	
Lock Up	908	71	56	4	No	Yes	Yes	
Court 4	745	70	63	0	No	Yes	Yes	
Judge's Lobby	774	72	60	1	Yes	Yes	Yes	
Small Claims	951	73	56	2	Yes	Yes	Yes	Supply and exhaust off
Jury of 6	821	72	59	1	Yes	Yes	Yes	Window mounted air conditioner-on
Court 5	786	73	56	0	Yes	Yes	Yes	
Jury Duty	980	74	56	1	Yes	Yes	Yes	
Civil Clerks	1166	74	50	5	Yes	Yes	Yes	
Court 1	942	74	54	44	No	Yes	Yes	
Court 2	658	69	49	0	No	Yes	Yes	
Court 3	718	65	48	0	No	Yes	Yes	

* ppm = parts per million parts of air
CT = water-damaged ceiling tiles

Comfort Guidelines

Carbon Dioxide - < 600 ppm = preferred
600 - 800 ppm = acceptable
> 800 ppm = indicative of ventilation problems
Temperature - 70 - 78 °F
Relative Humidity - 40 - 60%

TABLE 7

Indoor Air Test Results – Fall River District Court, Fall River, MA – September 1, 2000

Remarks	Carbon Dioxide *ppm	Temp. °F	Relative Humidity %	Occupants in Room	Windows Openable	Ventilation		Remarks
						Intake	Exhaust	
2 nd Floor Judge's Lobby	751	67	55	0	No	Yes	Yes	

Comfort Guidelines

* ppm = parts per million parts of air
CT = water-damaged ceiling tiles

Carbon Dioxide -	< 600 ppm = preferred
	600 - 800 ppm = acceptable
	> 800 ppm = indicative of ventilation problems
Temperature -	70 - 78 °F
Relative Humidity -	40 - 60%